

September 5, 2003

**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

PRIVATE FUEL STORAGE, L.L.C.

(Independent Spent Fuel Storage Installation)

Docket No. 72-22-ISFSI

NRC STAFF'S IDENTIFICATION OF WITNESSES

Pursuant to the litigation schedule approved by the Licensing Board during an August 20, 2003 telephone conference, the NRC Staff has tentatively identified the following individuals as its proposed witnesses on aircraft crash consequence issues in this proceeding:

I. Aircraft Speeds and Angles

Dr. Kazimieras M. Campe
Senior Reactor Engineer
Probabilistic Safety Assessment Branch
Division of System Safety and Analysis
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Rockville, Maryland

Dr. Amitava Ghosh
Principal Engineer
Center for Nuclear Waste Regulatory Analyses
Southwest Research Institute
San Antonio, Texas

II. Aircraft Fuel Fire Consequences

Mr. Christopher S. Bajwa
Thermal Engineer
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Rockville, Maryland

III. Structural Evaluation

Dr. Gordon S. Bjorkman
Senior Structural Engineer
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Rockville, Maryland

Mr. Robert E. Shewmaker
Senior Structural Engineer
Technical Review Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Rockville, Maryland

Dr. Douglas J. Ammerman
Structural Engineer
Transportation Risk and Packaging Department
Sandia National Laboratories
Albuquerque, New Mexico

Dr. Robert J. Kalan
Structural Analyst
Transportation Risk and Packaging Department
Sandia National Laboratories
Albuquerque, New Mexico

Mr. Kenneth W. Gwinn
Senior Member of the Technical Staff
Engineering Services Center
Sandia National Laboratories
Albuquerque, New Mexico

IV. Probability

Dr. Dennis R. Damon
Senior Level Advisor for Risk Assessment
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Rockville, Maryland

(Dr. Damon may also offer testimony concerning selected portions of the other areas identified above.)

The Staff has not yet determined whether it will present testimony concerning the potential radiological consequences of an aircraft crash at the PFS Facility. If such testimony is later deemed to be necessary or appropriate, the Staff would potentially present the following witnesses:

V. Radiation Dose Consequences

Dr. Stephanie P. Bush-Goddard
Nuclear Engineer
Technical Review Directorate
Spent Fuel Project Office
U.S. Nuclear Regulatory Commission
Rockville, Maryland

Mr. Michael D. Waters
Health Physicist
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Rockville, Maryland

The professional qualifications of Dr. Kazimieras Campe, Dr. Amitava Ghosh, and Mr. Michael Waters have previously been provided to the parties and have been entered in the evidentiary record. The professional qualifications of the eight other individuals named above are attached hereto.

Respectfully submitted,

Catherine L. Marco

Catherine L. Marco
Sherwin E. Turk
Counsel for NRC Staff

Dated at Rockville, Maryland
this 5th day of September, 2003

Christopher S. Bajwa
Thermal Engineer
U. S. Nuclear Regulatory Commission

EDUCATION

Stevens Institute of Technology, Hoboken, NJ - B.E. in Mechanical Engineering, 1993

REGISTRATIONS

Professional Engineer - Maryland

PROFESSIONAL HISTORY

U. S. Nuclear Regulatory Commission - Rockville, MD, 1993 to present

EXPERIENCE SUMMARY

Mr. Bajwa has more than 10 years of engineering experience in technical areas related to fire protection and thermal analysis. Mr. Bajwa began his career at the U. S. Nuclear Regulatory Commission as a General Engineer in the Reactor Engineer Intern Program. Subsequent to that program, he worked as a Reactor Systems Engineer in the Fire Protection Engineering Section of the Office of Nuclear Reactor Regulation. Mr. Bajwa is currently a Thermal Engineer in the Spent Fuel Project Office where his duties include the review and approval of the thermal design aspects of spent nuclear fuel storage casks and Independent Spent Fuel Storage Installation Facilities for compliance with 10 C.F.R. Part 72 regulations, and transportation packages of radioactive materials (including spent fuel) for compliance with 10 C.F.R. Part 71 regulations.

Some of Mr. Bajwa's specific project experiences are summarized below.

Review of applications for spent fuel storage under 10 C.F.R. Part 72:

- Castor Model X/32 S, GNB, Essen, Germany
- Advanced NUHOMS Dry Cask Storage System, TN-West, Fremont, CA
- Independent Spent Fuel Storage Installation for Private Fuel Storage, LLC
- Prepared thermal input to Interim Office Guidance, ISG-17 for storing GTCC wastes at an ISFSI facility

**Review of applications for spent fuel and other
radioactive materials transportation under 10 C.F.R. Part 71:**

- Pac-Tec EAGLE package for transporting radioactive materials, Packaging Technologies, Tacoma, WA
- 2835A - transportation cask for DOT - revalidation of UK certificate of Approval

- **NAC LWT- Amendment to transport high-burnup fuel assemblies, Nuclear Assurance Corporation, Norcross, GA**

Other projects:

- **Head of the thermal specialists review group within the Spent Fuel Project Office.**
- **Member of NRC task group examining the potential vulnerabilities of spent fuel storage casks and transportation packages to sabotage events including terrorist attacks. Responsible for the review and analysis of thermal effects of potential sabotage events.**
- **Served as lead technical reviewer for the NRC investigation of the impacts of the Baltimore tunnel fire of 2001 on spent fuel shipping casks. Worked closely with experts from National Institute of Standards and Technology, Center for Nuclear Waste Regulatory Analysis and Batelle-Pacific Northwest National Laboratories to create fire models and analyze fire effects on spent fuel transportation cask designs.**
- **Served as a key member of an American Society for Testing and Materials (ASTM) working group to develop standard E-2230-02 "Standard Practice for Thermal Qualification of Type B Packages for Radioactive Material"**

PUBLICATIONS:

Bajwa, C. and Regan, C., "Investigation of Thermal Response of Radioactive Material Transportation Casks to Open Pool Fire Test Simulations" Proceedings, 13th International Symposium on the Packaging and Transport of Radioactive Materials, Sept. 2001.

Bajwa, C., "An Analysis of a Spent Fuel Transportation Cask Under Severe Fire Accident Conditions" Proceedings, ANSYS® User's Group Conference, April 2002.

Bajwa, C., "Response of a Spent Fuel Transportation Cask to a Tunnel Fire Environment" Proceedings, HLW, TRU, LL/ILW, Mixed Hazardous Wastes and Environmental Management Conference, February 2003.

Bajwa, C., "Analysis of the Impact of a Tunnel Fire Environment on a Spent Nuclear Fuel Transportation Cask" Proceedings, ASME Pressure Vessels and piping Conference, PVP-Vol.467, July 2003.

Bajwa, C., "Analysis of Spent Fuel Transportation Cask Response to a Tunnel Fire Exposure" Proceedings, 44th Annual Meeting of the Institute of Nuclear Material Management, July 2003.

AWARDS:

- **Special Act award for technical work completed on fire barrier penetration seals presented by the U.S. Nuclear Regulatory Commission, July 1997**
- **Special Act award for efforts to establish finite element analysis capabilities in the Spent Fuel Project Office presented by the U.S. Nuclear Regulatory Commission, June 2000**
- **Selected as Employee of the Month for technical work completed on the Baltimore tunnel fire investigation by the U.S. Nuclear Regulatory Commission, October 2001**

Gordon S. Bjorkman
Senior Structural Engineer
Nuclear Regulatory Commission

SUMMARY OF QUALIFICATIONS

Broad background in structural mechanics gained through 30 years experience as a consultant, expert witness, university teacher and researcher for the National Science Foundation. Extensive experience in the analysis and design of nuclear power plant facilities, plate and shell structures, pressure vessels and piping, and the analysis and design of structures to resist blast, earthquake and missile impact. As an independent reviewer, provided over 100 hours of expert witness testimony before the Atomic Safety and Licensing Board hearings on the licensing of the Comanche Peak Nuclear Power Plant to address issues related to finite element modeling and the seismic analysis of civil structures, piping and raceways.

Areas of competency include: finite element methods, structural dynamics, stress analysis, impact analysis and blast effects, piping and pipe support evaluation, seismic qualification and soil-structure interaction, thermal stress analysis, probabilistic methods, reinforced concrete, prestressed concrete and steel design.

EDUCATION

PRINCETON UNIVERSITY:	Bachelor of Science in Engineering (Civil) with Honors - 1966
CORNELL UNIVERSITY:	Master of Engineering (Civil Structural) - 1968
UNIVERSITY of DELAWARE:	Ph.D. in Applied Science (Structural Mechanics) - 1975

PROFESSIONAL EXPERIENCE

NUCLEAR REGULATORY COMMISSION, Washington, DC 2002-Present
Senior Structural Engineer: Spent Fuel Project Office

STRUCTURAL MECHANICS CONSULTING, Woodstock, VT 2001-2002
Independent Consultant: Provided structural mechanics expertise to the nuclear industry.

- Developed the non-systems portions of the license renewal application for the primary containment structure at Rochester Gas & Electric's Ginna Station.
- Performed blast effects analysis of all safety related structures and security force enclosures at Millstone Units 2 & 3, and the reactor building and spent fuel pool of Millstone Unit to address a terrorist bomb attack.

EQE INTERNATIONAL, San Francisco, CA 1991-2001
Senior Consultant: Responsibilities included project management, corporate-wide consulting and marketing for special projects.

- Designed mobile, missile-impact-resistant steel vaults for the safe storage of U.S. tritium reserves. The Department of Energy approved the design and purchased 200 units.
- Performed blast effects analysis and probable maximum loss assessment for terrorist attack at four industrial facilities in England. Also performed blast effects analyses for a terrorist bomb attack at six U.S nuclear power plants.
- Performed soil-structure interaction (SSI) analysis of the Humboldt Bay Nuclear Power Plant (NPP) for the largest earthquake ground motion of any nuclear facility in the US. Performed structural integrity evaluation of the spent fuel pool to address and resolve Nuclear Regulatory Commission (NRC) safety concerns.
- Developed a 50-hour training program on structural dynamics and seismic qualification. Taught the program at seven nuclear utilities and a shorter course at Los Alamos National Labs.

- Designed innovative anti-terrorist vehicle barrier systems that were installed at four nuclear power plants.
- Developed finite element models and performed design basis re-analysis of the reinforced and prestressed concrete reactor containment structures at the Millstone, TVO (Finland) and Calvert Cliffs Nuclear Power Plants.
- Resolved all NRC safety concerns for the spent fuel pool at Brunswick Station by conclusively showing that the root cause of structural cracks was due to the original construction sequence and that the cracks were self-limiting and not a structural integrity concern.
- Performed soil-structure interaction and cask response analyses for Southern Company's and Duke Power's Independent Spent Fuel Storage Installations (ISFSI).

ABB IMPELL CORPORATION, Boston, MA

1986-1991

Senior Technical Manager

- Directed and performed comprehensive non-linear analysis of a spent fuel pool to resolve NRC concerns for structural integrity at the Oyster Creek Nuclear Power Plant. Prepared the final report that demonstrated the integrity of the pool and the root cause of large cracks. All NRC safety concerns were resolved.
- Performed independent review of the large static and dynamic finite element models of the reactor and turbine buildings for Niagara Mohawk Power (NMP). Found significant problems and developed a corrective program
- Co-directed start-up operations for the NMP In-Service Inspection (ISI) program that placed more than 100 engineers on site for two years to resolve non-conformance reports. Performed a structural integrity investigation of more than 1400 pipe support deficiencies to assess pre-ISI system operability.
- Developed methodology and criteria for the non-linear (gaps and friction) analysis of skewed pipe clamps and an evaluation methodology for pipe wall stresses when lug induced stresses exceeded ASME Code Case N-318 values.
- Performed finite element analysis of the primary containment shell at Ginna Station to support construction activities for removal of steam generators through the containment dome.
- Developed and implemented an analysis/evaluation strategy for the Ginna containment structure to address NRC concerns for the behavior of the connection between the vertically prestressed containment shell and ten-foot thick base mat.

CYGNA ENERGY SERVICES, Boston, MA

1981-1986

Corporate Consultant and Director of Special Projects

- Provided over 100 hours of expert witness testimony before the Atomic Safety and Licensing Board of the NRC on issues related to finite element modeling and the seismic analysis of civil structures, piping and raceways. My testimony was cited with approval in a Memorandum and Order written by the presiding judge.
- Performed nonlinear finite element analysis for the drop of a reactor pressure vessel head onto the reactor and the drop of the upper internals onto the reactor fuel core. Demonstrated no adverse consequences and compliance with NUREG-0612. Resolved the issue industry-wide.
- Developed an innovative methodology to analyze and qualify the major braced column line of the Ginna turbine building that other consultants (NUREG/CR-1821) had reported to be overstressed under the safe shutdown earthquake. Report submitted to the NRC resolved all safety concerns.

UNITED ENGINEERS, Philadelphia, PA

1978-1981

Structural Engineer

- Evaluated the safety of formwork scaffolding systems used to pour the primary containment shell concrete at several nuclear power plant sites. Recommended and implemented changes to prevent a potential progressive collapse failure.
- Evaluated stability during construction of the discontinuously stiffened steel containment shell liner at Seabrook Station and WPPSS.
- Developed static and dynamic shell models of a Mark I vent system for the analysis of hydrodynamic loads. Designed the vent system hydrodynamic steel deflector.

DREXEL UNIVERSITY, Philadelphia, PA

1975-1978

Assistant Professor of Civil Engineering: Responsible for teaching and research

- Taught graduate courses in Reinforced Concrete, Prestressed Concrete, Finite Element Methods, Advanced Structural Analysis and Engineering Economics.
- Winner of two research grants from the National Science Foundation to study inverse problems in elasticity and stress concentration minimization.
- Taught 40-hour course on finite element analysis at the Boeing Vertol Company.

PROFESSIONAL AFFILIATIONS and HONORS

• American Society of Civil Engineers (ASCE)
ASCE Subcommittee on Optimum Structural Design (1992-1995)
ASCE Committee on Composite Materials (1979-1982)
Reviewer, ASME Journal of Applied Mechanics
Reviewer, ASCE Journal of Engineering Mechanics
Principle Investigator, National Science Foundation (1976-1984)
Sigma Xi, The Scientific Research Society

PROFESSIONAL LICENSES

Professional Engineer (by examination), Commonwealth of Pennsylvania

PUBLICATIONS

Authored or co-authored more than two-dozen publications in peer reviewed journals and conference proceedings including:

ASME Journal of Applied Mechanics,
ASCE Journal of Engineering Mechanics,
Journal of Nuclear Engineering and Design,
ASCE Structures Congress,
U.S. Symposium on Rock Mechanics,
ASME Pressure Vessels and Piping Conference,
Department of Energy Symposium on Natural Phenomena Hazards Mitigation,
ASCE Engineering Mechanics Specialty Conference,
International Conference on Structural Mechanics in Reactor Technology,
Symposium on Current Issues Related to Nuclear Power Plant Structures, Equipment and Piping,
ASCE Conference on Electronic Computation,
Canadian Congress of Applied Mechanics, and
Journal of Engineering Geology

ROBERT E. SHEWMAKER, PE

Education:

BSCE University of Illinois, 1962
Highest Honors, concentration in Highways and Structures Options

MSCE University of Illinois 1963
Structures and Soil Mechanics/Foundations

Licenses:

EIT, Illinois, 1962 by exam
PE, Virginia, 1967 by exam, #4060 (currently inactive)
PE, Maryland, 1968 by reciprocity, #6623 (currently active)

Experience:

6/69 - Present:

Senior Structural Engineer with US Atomic Energy Commission and the US Nuclear Regulatory Commission. Served in the Containment and Component Technology Branch, Division of Reactor Licensing; the Structural Engineering Branch, Division of Reactor Standards; the Technical Assistance Branch, Division of Reactor Construction, Office of Inspection and Enforcement; the Office of Special Projects; the Technical Branch, Division of Low-Level Waste Management, Office of Nuclear Materials Safety and Safeguards (NMSS); Special Projects Branch, Division of Fuel Cycle Safety and Safeguards, NMSS; and the Technical Review Directorate, Spent Fuel Project Office, NMSS.

Responsible for the civil and structural reviews of numerous nuclear power plants for construction permits and operating licenses including Turkey Point, Palisades, Point Beach, Arkansas 2, Byron, Braidwood, Trojan, Zimmer and others. Responsible for the original standard review plans in the structural review arena. Responsible for the resolution of design, construction and operational problems arising at nuclear power plants including seismic pipe and equipment restraints, systems failures, structural failures, corrosion failures, soils and foundation problems, concrete materials problems and reinforced concrete construction problems including delamination of two post-tensioned concrete containment domes. Responsible for portions of NRC team efforts with industry codes and standards committees in the development of documents to guide the design and construction of nuclear power plants and other nuclear facilities including low-level radioactive waste near surface disposal facilities, a high-level waste vitrification facility, and spent fuel transportation and storage cask systems. Responsible for significant enforcement actions at facilities under construction and in operation as a technical support engineer in the Office of Inspection and Enforcement and the Office of Special Projects.

Served or serving as a member of numerous technical committees that developed industry codes, standards, and guidance documents including American Society of Mechanical Engineers (ASME), Boiler and Pressure Vessel (B&PV) Code, Section III, Div. 2; American Concrete Institute (ACI) 222, ACI 227, ACI 349, ACI 352, ACI 359, ACI 364 and ACI 374.

- 6/66 - 6/69:** **Senior Structural Engineer with Bechtel Corporation (Power Division), Galtersburg, MD.**
- Responsible for structural analysis and design of conventional and nuclear-powered electric generating facilities including foundations, circulating water systems including intake and discharge structures, transmission towers and foundations, pile foundations, turbine pedestals and foundations and post-tensioned concrete containments. Responsible for analysis and design group using finite element methods and classical shell theory for the analysis of the steel-lined post-tensioned concrete containments for the east coast Power Division of Bechtel. Responsible for resolution of field problems arising during plant foundation and concrete construction at nuclear plants.
- 7/65 - 5/66:** **Structural Engineer with Anderson, Birkeland, Anderson and Mast, Structural Engineers and Concrete Technology Corporation, Tacoma, WA.**
- Responsible for the analysis (including computer applications), design and field construction coordination and inspection for reinforced, pretensioned, and post-tensioned concrete structures for bridges, pier and wharf facilities, buildings and special thin shell structures for precast concrete applications. Design conditions included high seismic zones of the Pacific Northwest and Alaska as well a dynamic loadings from impacts of seagoing ships, inland barges and ice.
- 6/63 - 6/65:** **Engineer Officer in the U.S. Army Corps of Engineers with the 146th Engineer Detachment, 8th Special Forces Group (Abn) and the U.S. Army School of the Americas.**
- Responsible for design and construction of heavy timber structures, airfields, roads, bridges, buildings and fortifications and special operations projects as project officer and team leader. Responsible for civic action and military missions in Central and South America and Southeast Asia. Instructor in military engineering subjects including explosives and demolitions.
- 1961-1963** **Structural Research Assistant and Graduate Fellow, Civil Engineering Department, University of Illinois.**

Douglas J. Ammerman

**Sandia National Laboratories
Albuquerque, NM 87185**

WORK EXPERIENCE

10/88 - Present

Structural engineer, Transportation Risk and Packaging Department, Sandia National Laboratories, Albuquerque, NM.

Project leader for structural response issues in radioactive material transportation packages.

Issues include:

- **Non-linear dynamic analyses**
- **Structural code benchmarking**
- **Structural testing of transportation packages**

Program manager for off-site radioactive material transportation capability assessment programs for Rocky Flats and Hanford.

7/84 - 10/88

***Research associate, Department of Civil Engineering, University of Minnesota.**

Structural testing of steel and reinforced concrete building components.

Development of analytical methods for designing frames with flexible connections.

FORMAL EDUCATION

Ph.D., Civil Engineering, University of Minnesota, 1988.

MSCE, Civil Engineering, University of Minnesota, 1986.

BS, Civil Engineering, University of Minnesota, 1984.

AREAS OF EXPERTISE

Radioactive material transportation systems and regulations.

Impact dynamics.

Crash testing.

Component seal behavior.

Civil engineering structural design and analysis.

OTHER SKILLS/EXPERIENCE/ACTIVITIES NOT LISTED ABOVE

Organizer of the Symposium on Development, Validation, and Application of Inelastic Methods for Structural Analysis and Design, held as part of the 1996 ASME International Mechanical Engineering Congress and Exposition.

Session organizer for "Assuring Safe Transport of Radioactive Material by Land, Sea, and Air" at PATRAM 01.

Attended DOE Workshop, Methods for Reviewing Safety Analysis Reports for Packaging, 1989.

PUBLICATIONS (partial list)

- "United States Nuclear Regulatory Commission Package Performance Study Test Protocols", June 2002.
- "Spent Nuclear Fuel Transportation Package Performance Study Issues Report", NUREG/CR-6768, June 2002.
- "Revision of the ASME Section III, Division 3 Code for Puncture Analysis", Sept. 2001.
- "Test Facilities for Radioactive Materials Transport Packages at Sandia National Laboratories, USA", 2001.
- "Reexamination of Spent Fuel Shipment Risk Estimates", NUREG/CR-6672, March 2000.
- "Crush Loadings to Radioactive Material Transport Packages During Ship Collisions", 1998.
- "Development of a Container for the Transportation and Storage of Plutonium Bearing Materials", May 1998.
- "Testing and Analysis to Determine the Shell Thickness Required to Prevent Puncture", May 1998.
- "A Comparison of Regulatory Impacts to Real Target Impacts", May 1998.
- "The Effect of Cargo on the Crush Loading to Radioactive Material Transportation Packages in Ship Collisions", May 1998.
- "Use of Inelastic Analysis to Determine the Response of Packages to Puncture Accidents", July 1997.
- "Regulatory and Extra-Regulatory Testing to Demonstrate Radioactive Material Packaging Safety", May 1997.
- "Benchmarking of Finite Element Codes for Radioactive Material Transportation Packages", November 1996.
- "A Comparison of Methods for Evaluating Structure During Ship Collisions", August 1996.
- "An Assessment of Simplified Methods to Determine Damage from Ship-to-Ship Collisions", December 1995.
- "Analysis of a Ship-to-Ship Collision", December 1995.
- "Testing of the Structural Evaluation Test Unit", December 1995.
- "Analytical Determination of Package Response to Severe Impacts", December 1995.
- "Development of a Non-Linear Dynamic Analysis Acceptance Criterion for Radioactive Material Transportation Packages", July 1995.
- "Extra-Regulatory Impact Tests and Analyses of the Structural Evaluation Test Unit", July 1995.
- "Structural Analysis of Radioactive Material Transportation Packages", June 1995.
- "Incentives for Use of Inelastic Analysis in RAM Transport Container Design", March 1993.
- "A Method for Comparing Impacts with Real Targets to Impacts onto the IAEA Unyielding Target", September 1992.
- "Development and Evaluation of Measurement Devices Used to Support Testing of Radioactive Material Transportation Packages", September 1992.
- "Analysis in Support of Storage of Residues in the Pipe Overpack Container", SAND98-1003, April 1998.
- "Rocky Flats Residues (RFR) Criticality Analyses," TTC-1435, April 1998.

- "Testing in Support of Transportation of Residues in the Pipe Overpack Container", SAND97-0716, April 1997.
- "Dynamic Pulse Buckling of Cylindrical Shells Under Axial Impact: A Comparison of 2D and 3D Finite Element Calculations with Experimental Data", SAND93-0350, April 1995.
- "Use of Inelastic Design for Radioactive Material Transportation Packages", SAND92-1842, December 1993.
- "Accelerometer and Strain Gage Evaluation", SAND91-0077, June 1991.
- "An Analysis of Parameters Affecting Slapdown of Transportation Packages", SAND90-2187, June 1991.

Robert J. Kalan

Education:

- 2000: Rensselaer Polytechnic Institute, Troy, New York**
Ph.D., Mechanical Engineering
Dissertation: Modeling Thermal Stresses and Defects in Single Crystal InP Grown from the Melt
- 1995: University of Florida, Gainesville, Florida**
Master of Science, Mechanical Engineering
Thesis: Three-Dimensional Finite Element Analysis of Welded Plates
- 1987: Widener University, Chester PA**
Master of Engineering, Mechanical Engineering
- 1982: Rutgers University College of Engineering, New Brunswick, NJ**
Bachelor of Science, Mechanical Engineering

Experience:

Sandia National Laboratories, Albuquerque, NM
August 2001- Present
Senior Member of the Technical Staff
Transportation Risk and Packaging Department
Structural Analyst
Conduct quasi-static and dynamic finite element analyses of spent nuclear fuel shipping and storage canisters as apart of the NRC Package Performance Study and the NRC Vulnerability Project.

Rensselaer Polytechnic Institute, Troy, NY
September 1995 – July 2001
Research Assistant: Computational Solid Mechanics Lab
Developed a theoretical and computational model, using the finite element method, to predict the stress and defects (dislocations) in single crystal InP grown from the melt.

Martin Marietta Defense Systems, Pittsfield, MA
January 1995 – September 1995
Structural Analyst
Conducted finite element analyses, to determine the structural integrity and service life of the regenerative Liquid Propellant Gun (RLPG).

University of Florida, Gainesville, Florida
January 1994 – August 1994

Research Assistant

Developed a finite element model of a welded plate to predict the magnitude and distribution of residual stresses.

1992 – 1993

Teaching Assistant

Undergraduate machine design course

Beloit Fiber Systems Inc., Pittsfield, MA

1989 – 1992

Mechanical Design Engineer

Designed and developed paper pulp processing equipment. Start-to-finish project responsibilities from initial concept, design and analysis to manufacturing and installation.

Naval Air Engineering Center, Lakehurst, NJ

March 1983- 1989

Mechanical Design Engineer/Project Leader

Worked on the design and development of aircraft launching systems used aboard aircraft carriers. Design responsibilities included initial concept, design and analysis to final testing, procurement and implementation.

Publications: Kalan, R.J. and Smith J.A., "Structural Response of a Nuclear Spent Fuel Canister Subjected to Large Thermal Loads", Proc. of INMM 44th Annual Meeting, Phoenix, AZ, 2003

Kalan, R.J., Smith J.A., and Ammerman D.J., "Structural Response of a Nuclear Spent Fuel Rail Cask to Aircraft-Like Component Impacts", Proc. of INMM 44th Annual Meeting, Phoenix, AZ, 2003

Kalan, R.J., Smith J.A., and Ammerman D.J., "Structural Analyses conducted for the NRC Package Performance Study (PPS) Test Protocols", Proc. of INMM 44th Annual Meeting, Phoenix, AZ, 2003

Kalan, R.J. and Maniatty, A.M., "Micromechanical Based Constitutive Relations for Modeling the Bulk Growth of Single Crystal InP." Journal of Crystal Growth, vol. 233, 645-659, 2001

Kalan, R.J. and Maniatty A.M., "Indium Phosphide Constitutive Model Used in Crystal Growth." R.C. Picu and E. Kremple (eds.) Fourth International Conference on Constitutive Laws for Engineering Materials, pp 90-93, Rensselaer Polytechnic Institute, Troy, NY (1999)

Chung, H., Si, W., Dudley, M., Bliss, D.F., Kalan, R.J., Maniatty, A.M., Zhang, H., and Prasad, V., "Characterization of Defects Structures in Magnetic Liquid Encapsulated Kyropoulos Grown InP Single Crystals." J. Crystal Growth, Vol. 181, 1997

Kenneth W. Gwinn
Senior Member of the Technical Staff
Sandia National Laboratories
Albuquerque, NM

EDUCATION:

1979, Master of Science, Civil Engineering Structures,
Oklahoma State University, Stillwater, OK

1978, Bachelor of Science, Civil Engineering, Oklahoma
State University, Stillwater, OK

EXPERIENCE:

Kenneth Gwinn joined Sandia National Laboratories after receiving his Masters degree from Oklahoma State University, in 1980. He has worked in many different engineering areas within the Engineering Sciences Center at Sandia, including vibration and shock design and analysis, and non-linear impact analyses. He took Entrepreneurial Leave from Sandia from 1995 to 1998, to assist in the commercialization of the Sandia airbag technologies, which he helped to invent. Upon returning to Sandia, he worked for one year in the Weapon Systems Center as the lead mechanical engineer for a test vehicle, and then returned to the Engineering Sciences Center in 2001. He continues in leading the Sandia structural investigation of the Columbia shuttle accident, and investigation and mitigation of terrorist threats for DOE, DOD and NRC. Specific areas of work experience follow.

DOE/DOD/NRC Vulnerabilities Studies: Mr. Gwinn has been a key member of the structural investigation and mitigation efforts for many government sites after the 9-11 terrorist attack. He helped devise the threat scenarios definition, performed many scoping and detailed analyses, and participated in the mitigation of these scenarios. This work continues in all areas.

Columbia Shuttle Investigation: Mr. Gwinn is leading the Sandia structural investigation for the space shuttle accident. He is defining and obtaining the material characterization of the many novel materials used on this space system, and is coordinating this and other analysis work through the NASA Tile Impact Committee. This work is ongoing.

Weapon Systems Experience: Mr. Gwinn was the mechanical lead for the W78 JTA6 program. He has also performed many analyses for the W80 system (WES cover) and B61 project (mod 7 and 11). He was part of the B61-7 Radar Nose project redesigning the weapon nose to mitigate impact for the new common radar system; specifically he was responsible for the head-on analyses, where validation of the testing with the massively parallel computer models is his primary task. He also assisted with the B61-11 penetrator case design to survive impact loads and in an analysis of the loads during the penetration.

Lightweight Airbag and Fabric Technology: Mr. Gwinn co-invented the lightweight Sandia airbag. He developed new fabric analysis and design techniques for the success of this novel project. He also served as lead structural designer for these systems, and gained business/customer experience with this commercialization project while taking entrepreneurial leave from Sandia. He is the author or co-author of 7 patents owned by Sandia from this work. Four additional patents have been applied for and are pending at this time. He coordinated the design implementation of the airbag in systems throughout Europe and the US. This work is ongoing.

JPL/Mars Lander Impact: Using experience and analysis techniques gained from the airbag work, Mr. Gwinn applied this technology to assist NASA/JPL to analyze and assist with the design of the Mars lander vehicle airbags (the only successful landing on Mars to date). He successfully developed a very complex analytical model which was verified with scale testing and then extrapolated to the Martian environment to understand the loads on the various components and off-normal impacts onto the planet's surface.

USS Iowa Accident Investigation: Mr. Gwinn was one of the core members of the USS IOWA investigation team, responsible for the structural analyses. He postulated probable scenarios for the ignition scenario based on explosive pellet strain/cracking; he analyzed and correlated the explosive tests evidence with this analysis to help determine the probability of sabotage or accident scenarios in this incident. He performed the structural analysis which disproved the final Navy claim of sabotage, presenting this to the Navy Sea System Command.

Reentry Vehicle Design/Target Analysis: Mr. Gwinn has performed many analyses to support the design of RV targets including modal/vibration test/analysis correlation for target definition for missile coordinators, failure analyses of shell structure, and support and design of internal components - all in the short time required by these early SDI programs.

SDI Lethality of Reentry Vehicles: Mr. Gwinn participated in the research and development of analytical tools to determine the lethality of various targets for support of the SDI and TMD missions. These were correlated with full-scale explosive testing to substantiate these effects and lethality assessments.

Satellite Component Analysis/Design: Mr. Gwinn has performed many analysis and design to solve usually late-term problems encountered with classified satellite components, requiring novel solutions to meet time frame of these programs.

NTS Containment Analyses: Mr. Gwinn performed first 3D analyses of Line-of-Site testing at the Nevada Test Site to assess containment and damage to test tunnels during nuclear underground testing. These were used to predict damage to the test tunnels and the test equipment during Misty Rain and Misty Jade tests prior to the suspension of NTS large scale testing.

ANSI Standards Effort for Nuclear Waste Transportation: Mr. Gwinn is currently chairman of N14.23 and co-chair of N14.2 committees to write standards for tiedowns, manufacture, and maintaining semi-truck transported nuclear waste. He has defined and completed many series of tests with full-scale components in the verification of analyses to define the requirements of these structures, participating with ORNL and Savannah River in these tests. He has completed the drafts of these standards and they are currently in review by the industry and have been voted on by the N14 committee of ANSI.

Nuclear Waste Transportation Analyses: Mr. Gwinn performed the first 3D analysis simulations at SNL of many nuclear waste shipping casks in severe impact situations, correlating these results with experiments and assisting the design of tests. He also assisted with the design of many of these components.

PATRAN Coordinator at Sandia: Mr. Gwinn was the point of contact for Sandia for the finite element pre- and post-processing code PATRAN. He initiated the incorporation of PATRAN into the Sandia Exodus system of the Engineering Sciences to allow the direct use of all SNL analysis codes with this product. He has served as Western Patran Users Association chairman, coordinating Sandia's analysis requirements with industry.

PUBLICATIONS:

1. Thermal and Structural Code Evaluation, PATRAN '83 Proceedings.
2. Test Specification for TRUPACT-1 Vibration Assessment, SAND85-1369.
3. The Development of the Beneficial Uses Shipping System Cask, Waste Management '85 Proceedings, 1985.
4. Comparisons of Analytical and Experimental Results of the Misty Rain Event, 10th Intl. Containment Conference SRD.
5. The Beneficial Uses Shipping System Cask, PATRAM '86 Proceedings.
6. The shock Absorbing Effects of the BUSS Cask Cooling Fins, SAND86-0317.
7. Shock and Vibration Environments for Truck-Transported Nuclear Waste: Test and Analysis, '86 Institute of Nuclear Materials Management Proceedings, 1986.
8. Shock and Vibration Environments: Road Simulator Tests, PATRAM '86 Proceedings, 1986.
9. TRUPACT-1 Over-The-Road Test, SAND87-0513, 1987.
10. Component Mode Synthesis Using Experimental Modes Enhanced by Mass Loading, 25th Structures, Structural Dynamics and Materials Conference, 1988.
11. Lethality of Long-Term Spot Loads on Solid Rocket Boosters as Determined by Structural Analyses, 1988 Strategic Defense Initiative Technical Achievements Symposium, 1988.
12. Considerations Involved in the Display of Finite Element Results Using Animation, ASME PVP Conference, PVP-Vol. 143, 1988.
13. Design Basis for the Resistance to Shock and Vibration, PATRAM '89 Proceedings, 1989.
14. Review of the USS IOWA Incident, SAND90-1158, 1990.
15. Three Dimensional Structural Analyses of Reentry Vehicles, ABAQUS Users Conference and Proceedings, 1990.
16. Three Dimensional Structural Analyses of Reentry Vehicles, 31st Structural Dynamics and Materials Conference Proceedings, 1990.
17. Structural Analyses and Tests of Truck Transported Nuclear Waste Shipping Containers, 9th International Modal Analysis Conference, 1990.
18. Three-Dimensional Thermomechanical Analyses of Reentry Vehicles, Computing Systems in Engineering, Vol. 1, Nos 2-4, 1990.19. Applications of Visualization in Finite Element Studies, Invited Lecturer at Waterways Experiment Station Scientific Visualization Center Seminar, 1991.

20. Over-the-Road Tests of Nuclear Materials Package Response to Normal Environments, SAND91-0079, 1991.
21. Over-the-Road Testing of Radioactive Materials Packaging, Waste Management '91 Proceedings, 1991.
22. Structural Response Predictions for the Full Scale Impact Tests, SAND92-2471 SNSI, 1992.
23. Debris Formation from Exo-Atmospheric Intercept, 1992 ABAQUS Users Conference Proceedings, 1992.
24. Structural Analyses Used in the Sandia Investigation of the USS IOWA Incident, Invited Speaker at the '92 ABAQUS Users Conference and Proceedings, 1992.
25. Status Report: Parachute System Design, Analysis, and Simulation Tool, AIAA 93-1208, 1993.
26. Aerothermal/Structural (ATS) Demise Analysis for the Propellant Initiation Program, SAND93-0526 SNSI, 1993.
27. Finite Element Analyses In a Distributed Environment, Invited Lecturer at 1994 ASME PVP Conference, 1994.
28. Airbags to Martian Landers - Analyses at Sandia National Laboratories, Invited Lecturer, '94 ABAQUS Users Conference and Proceedings, 1994.
29. A Novel CFD/Structural Analysis of a Cross Parachute, AIAA 94-0752, 1994.
30. High Strain-Rate Testing of Parachute Materials, 13th Aerodynamic Decelerator Conference, 1995.
31. Structural Analyses of the JPL Martian Pathfinder Impact, 13th Aerodynamic Decelerator Conference, 1995.
32. Structural Analyses Used in the Design and Development of the Precision Technology Airbag, 1st Biennial Tri-Laboratory Engineering Conference on Computational Modeling, 1995.
33. Performance Advantages of Lightweight Fabric Airbags, SAE Airbag Design and Performance TOPTEC, 1997.
34. Simulation of Earth Penetration Shock Using High-Speed Impact into an Engineered Water Target, Shock & Vibration Symposium, 1999.

SUPPLEMENTARY ACHIEVEMENTS:

Chairman of 2 ANSI writing subcommittees for Nuclear Waste Transportation Standards.

7 Patents awarded from airbag research and development (SNL owned):
6,283,499 Airbag Device having an Inner Flexible Heat Shield/Flow Device

5,482,317 Structurally efficient inflatable protective device
5,533,755 Structurally efficient inflatable protective device
5,607,182 Structurally efficient inflatable protective device
5,687,986 Attachment device for an inflatable protective cushion
5,823,567 Folded inflatable protective device and method for making same
5,845,928 Attachment device for an inflatable protective cushion
6,283,499 Airbag Device with Inner Flexible Heatshield and Flow Directing Bag

4 additional patents applied for still in process.

MSC/Patran User Advisory Board Member 1995

Twice invited Speaker to ABAQUS Users Conference for novel solutions to engineering problems.

DENNIS R. DAMON
Senior Level Advisor for Risk Assessment
Office of Nuclear Materials Safety and Safeguards
U. S. Nuclear Regulatory Commission
Washington, DC 20555

CHRONOLOGICAL SUMMARY:

- 1962-67** **Attended Seattle University and University of Washington. Obtained B.S. in Physics (1967) from University of Washington with extensive minor in numerical analysis. Course work included probability theory.**
- 1968-72** **Served in U.S. Navy as surface warfare officer on minesweeper and destroyer.**
- 1972-73** **Studied Computer Science at University of Washington prior to grad school.**
- 1973-1979** **Graduate school at University of Washington. Received M.S. (1977) and Ph.D. (1980) in Nuclear Engineering. Course work included reliability engineering, and probabilistic risk assessment. Ph.D. dissertation was a signal processing program based on statistical estimation theory applied to data from a core meltdown test.**
- 1979-1987** **Senior Engineer for General Electric (GE) Advanced Nuclear Technology Operation, Sunnyvale, California, in its Probabilistic Risk Assessment and Safety Criteria Unit. Work consisted of developing PRA and probabilistic optimization methods and applying them to DOE advanced nuclear reactor designs.**
- 1987-1994** **Principal Engineer for GE (now Martin Marietta) Astro Space Division, San Jose, California. Performed probabilistic risk assessment and other safety analysis for the SP-100 space reactor. Developed methods, data, and a computer code for analyzing radiological consequence analysis of space mission accidents. Began application of this method to Cassini spacecraft Radioisotope Thermoelectric Generator mission.**
- 1994-2000** **Senior Nuclear Process Engineer (criticality specialist) with U. S. Nuclear Regulatory Commission, Division of Fuel Cycle Safety and Safeguards. Developed nuclear safety regulations (10 C.F.R. Part 70, Subpart H), reviewed fuel cycle facility license applications for criticality safety. Implemented a probabilistic method for evaluating accident likelihoods in NUREG-1520, the Standard Review Plan for License Applications from Major Fuel Cycle Facilities. Initiated and was Project Manager for a research project by Oak Ridge National Laboratory, which developed a probabilistic method of uncertainty and sensitivity analysis for validation of criticality calculations.**
- 2000-2003** **Senior Nuclear Process Engineer in the NMSS Risk Task Group. Promoted to NMSS Senior Level Advisor for Risk Assessment (Sept. 2001). Assisted in developing methods for, and implementing the use of, probabilistic risk information and training in the nuclear materials and waste arenas. Recently active in advising in the development of methods for use of quantitative probability and consequence risk information in decision-making; and selection of quantitative probabilistic risk guidelines applicable to materials and waste regulatory activities.**

Dennis R. Damon

TECHNICAL AREAS OF EXPERTISE:

Eleven years developing computer codes implementing new PRA methods focusing on the application of new probabilistic modeling techniques to PRA uncertainty and sensitivity analysis, probabilistic containment failure analysis, probabilistic fuel pin failure analysis, probabilistic core melt analysis, safety optimization, and probabilistic safety goals.

Expert in all phases of Probabilistic Risk Assessment. Have performed each type of analysis involved in executing a PRA, and have developed new methods in most areas; including: initiating event development, event tree methods, reliability modeling, transient analysis, seismic PRA modeling and hazard curve development, core meltdown analysis, pin failure analysis, containment analysis, source term development, dose/health effects consequence analysis, uncertainty/ importance/ decision analysis using PRA.

Expert in all phases of radiological consequence analysis, including meteorological dispersion techniques and data bases, both global and local/meso-scale, aerosol behavior including deposition velocity models and experiments, incorporating decay chains, behavior of deposited material on vegetation and in soil, food chain models and studies, ICRP internal dosimetric models, BEIR IV and V, and alpha emitter radiolytic fragmentation.

Substantial experience in fast reactor safety analysis (especially space reactors), hazardous environment parameters involved in space flight, nuclear & chemical weapons proliferation and disposal issues.

Five years at USNRC working to implement a risk-informed regulatory approach in 10 C.F.R. Part 70, Domestic Licensing of Special Nuclear Material. Six years reviewing the reliability, safety margins, validation, and other aspects of nuclear criticality safety of major fuel cycle facilities. Three years developing and promoting the use of probabilistic risk analysis methods across the full spectrum of nuclear materials and waste activities regulated under NMSS.

SPECIFIC TECHNICAL SKILLS:

U. of Washington: Performed neutron activation analysis- designed cf252 prompt NAA system; performed numerous neutron activation analyses; developed new algorithm for statistical estimation of experiment outcomes from low resolution detector data. Applied this method to actual test data.

Mathematical Sciences NW: Produced high temperature nuclear materials data base.

Chem-Nuclear Systems, Inc.: Performed low level waste transportation cost study.

General Electric: Developed a method for large-scale system optimization. Applied this new algorithm (undominated branch and bound) to selection of optimal safety features. Produced event trees, dose analysis for advanced reactor probabilistic risk assessments. Project leader of probabilistic risk assessment of prototype reactor. Fault tree reliability analysis of advanced nuclear reactor systems. Performed meteorological transport & radiological dose calculations, using various codes. Developed method for containment inter-compartment transport analysis

Dennis R. Damon

code probabilistic uncertainty analysis. Produced RISKSP code for integrated evaluation of probabilities and consequences in a PRA, with uncertainty analysis. Performed nuclear-thermal-hydraulic safety transient analysis of reactors. Performed SP-100 Space Reactor nuclear safety analyses. Developed analysis methods for meteorological & dose analysis of space nuclear accidents.

PUBLICATIONS:

D. R. Damon, R. W. Albrecht, "Calculation of Fuel Motion from In-Core Radiation Detectors", in Third Topical Meeting on Fuel Motion Diagnostics, Los Alamos, September 1976.

R. Damon, "Fuel Motion Unfolding by the Method of Regularization", Ph.D. Dissertation, University of Washington, December 1979.

K. A. El-Sheikh, D. R. Damon, "Methodology for the Selection of LWR Safety R & D Projects", GE Report ARSD-00090, October 1980.

K. A. El-Sheikh, D. R. Damon, M. I. Temme, "LWR Risk Management by Safety R & D", in Transactions of the ANS/ENS International Meeting on Probabilistic Risk Assessment, Port Chester, New York, September 20-24, 1981.

D. E. Hurd, D. R. Damon, et al., "Single Plant Risk Model Development and Application", GE Report GEFR-00573, December 1981.

D. R. Damon, GE ARSD Report, "Updated Probabilistic Risk Analysis of the Large Developmental Plant LMFBR Design", Sept 1982.

D. R. Damon, "A Probability Quantification Procedure for Containment Response Event Trees", GEFR-00729, Sept 1984.

D. R. Damon, "Large Scale Prototype Breeder Reactor Risk Assessment", USNRC Safety Discussion Module 10, Sept 1984.

D. R. Damon, "Procedures for Obtaining Core Response Event Tree Probabilities", GE report GEFR-00772, Sept 1985.

D. R. Damon, "DOE Advanced Liquid Metal Reactor Program", PRISM Preliminary Probabilistic Risk Assessment, Sept 1985.

D. R. Damon, "Input/Output Description of RISKSP Computer Program", GE report GEFR-00795, Sept 1986.

D. R. Damon, et.al., "SP-100 Mission Risk Analysis", GE report GESR-00849, Aug 1989.

D. R. Damon, M. I. Temme, N. W. Brown, "SP-100 Mission Risk Analysis" in Trans. 7th Symposium on Space Nuclear Power, Albuquerque NM, Jan 1990.

D. R. Damon, M. I. Temme, N. W. Brown, "SP-100 Mission Risk Analysis" in Nuclear Safety, Jan 1990.

Dennis R. Damon

C. T. Ha and D. R. Damon, "Consideration of Process Timing and Particle Size in Space Nuclear System Consequence Calculations" in Trans. 9th Symposium on Space Nuclear Power, Albuquerque NM, Jan 1992.

D. R. Damon, "Lessons Learned from Accident Precursor Events Involving Enriched Uranium", in Institute of Nuclear Materials Management transactions, July 1996.

D. R. Damon, "Application of Integrated Safety Analysis to Nuclear Fuel Cycle Facilities", paper for the IAEA Int'l. Conference on Topical Issues in Nuclear, Radiation, and Radioactive Waste Safety, Vienna, August 31, 1998.

D. R. Damon, "Validation of Nuclear Criticality Safety Calculations at Enrichments of 5 to 20 Percent", transactions of the American Nuclear Society, June 1999.

NUREG-1520 (Draft), Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility, Chapter 3, Integrated Safety Analysis, May 2000.

D. R. Damon, "Use of Risk Assessment by the USNRC for Non-Reactor Applications", paper for the IAEA Technical Committee Meeting, "Current Practices in Probabilistic Safety Assessment for Non-reactor Nuclear Facilities, Vienna, November 13-17, 2000.

Chairperson, Writing Group, IAEA Technical Document, "Procedures for Conducting Probabilistic Safety Assessment for Non-Reactor Nuclear Facilities", November 2000.

Stephanie P. Bush-Goddard, Ph. D.
Nuclear Engineer
Technical Review Directorate
Spent Fuel Project Office
U. S. Nuclear Regulatory Commission

EDUCATION:

Ph.D. in Environmental Health Sciences
University of Michigan, Ann Arbor, Michigan, 2000

M.S. in Environmental Health Science
University of Michigan, Ann Arbor, Michigan, 1997

B.S. in Mechanical Engineering
University of Memphis, Memphis, Tennessee, 1991

PROFESSIONAL EXPERIENCE:

June 02- Present Nuclear Engineer, U.S. Nuclear Regulatory Commission, Rockville, Maryland

In her nuclear engineering duties, Dr. Bush-Goddard is responsible for performing shielding and containment reviews of spent fuel storage and transportation casks, and independent spent fuel storage facilities. She is also responsible for reviewing Environmental Reports and developing Environmental Assessments and is responsible for coordinating and managing the radiological consequence team for the vulnerability analysis of spent fuel casks.

Aug 02- Present Assistant Professor, University of Maryland University College

Dr. Bush-Goddard currently teaches at the University of Maryland, University College. She teaches an Environmental Risk Assessment Class in the Graduate School of Management and Technology.

Feb 00-May 02 Project Manager/Health Physicist, U.S. Nuclear Regulatory Commission

As a project manager, Dr. Bush-Goddard developed and managed complex rulemakings. This includes researching relevant history of the regulation to be revised, developing schedules, identifying all tasks necessary to complete the rulemaking and responsible parties and developing resource estimates. She determines whether an environmental assessment (EA) or Environmental Impact Statement (EIS) will be prepared and identified need for contractor support

Sep 95-Aug 99 Environmental Health Science Graduate Research Assistant
University of Michigan, Ann Arbor, Michigan

Dr. Bush-Goddard developed course work, lectured and graded assignments for a course entitled "Environmental Modeling of Radioactive Contaminates." She was also a teaching assistant for Epidemiology and Biostatistics courses in the Graduate School of Public Health and responsible for managing graduate laboratory of chemical and radionuclides.

May 95-Aug 95

Department of Energy Health Physics Fellow
Oak Ridge Institute for Science and Education

As a DOE Health Physics Fellow, Dr. Bush-Goddard developed a bibliography for background radiation and implemented a ranking system of the most important radionuclides at the site. Published two documents that identified the set of radionuclides most likely to be Savannah River Site related.

May 91-Aug 94

Nuclear Engineer
Norfolk Naval Shipyard, Portsmouth, Virginia

As a Nuclear Engineer, Dr. Bush-Goddard evaluated every facet of the shipyard's nuclear program through a comprehensive program of audits, in-depth reviews and surveillances. She ensured that nuclear propulsion plant work adhered to technical specifications and requirements; she also delivered training on Environmental Monitoring and Radioactive Material Accountability and Control.

SELECTED PUBLICATIONS, RESEARCH AND SCHOLARLY ACTIVITY:

Bush, S. P., Hamby, D.M., Techniques for Beta Spectroscopy using Monte Carlo methods and spectral deconvolution, Health Physics Society Annual Meeting, Philadelphia, PA, *Health Physics*, June 28, 1999

Bush, S. P., Hamby, D.M., Initial Investigations into Developing a Wall-Less Proportional Counter for use in Radiologically contaminated soils. *Radiation Protection Management*, 15(2):43-47, 1998

Bush, S. P., Hamby, D.M., Martin, J.E., Preliminary development of a wall-less gas-filled proportional counter for in-situ field analysis of nuclear contamination in soil. Office of Environmental Management. Department of Energy. Grant No. DE-FG05-96EW00001. University of Michigan, Ann Arbor, MI, March, 1997

Bush, S. P., Hamby, D.M., Development of a screened cathode gas flow proportional counter for in-situ field determination of alpha contamination in soil, San Antonio, TX; *Health Physics*, 72:S53, 1997

Bush, S. P. In situ field determination of radioactive contamination in soil using a wall-less gas flow proportional counter. Health Physics Society Annual Meeting, *Health Physics* Seattle, WA; July 23, 1996

Bush, S. P., Determining Radionuclides of potential concern for establishing Background Environmental Data Sets at Savannah River Site (SRS) (U), WSRC-TR-95-0324, 1995

**Documents of Background Radiation Data at Savannah River Site (SRS) and Its Immediate Vicinity,
WSRC-TR-95-0323, 1995**

SELECTED PRESENTATIONS (Papers and Poster)

Bush-Goddard, S.P., Status on Entombment, NEI/EPRI Decommissioning Forum 2002, Tempe, Arizona, March 2002

Bush-Goddard, S.P., Entombment Option for Decommissioning Power Reactors. Decommissioning Conference, TLG Services, Captiva Island, Florida, October, 2000

Bush-Goddard, S. P., Entombment Option for Decommissioning Power Reactors. American Nuclear Society/European Nuclear Society International Meeting, Washington, D.C., November, 2000

Bush, S.P., Beta Spectroscopy Techniques using Monte Carlo and Mathematical Techniques. Great Lakes Chapter of the Health Physics Society Spring Symposium. Ann Arbor, MI, May 13, 1999

Bush, S. P., Hamby, D.M., Techniques for Beta Spectroscopy using Monte Carlo methods and spectral deconvolution, Health Physics Society Annual Meeting, Philadelphia, PA, June , 1999

Bush, S. P., Is subsurface radioactive waste a health issue? Public Health Students of African Decent 12th Annual Minority Health Conference, Ann Arbor, MI, March 1998

Bush, S. P., Development of a screened cathode gas flow proportional counter for in-situ field determination of alpha contamination in soil. Health Physics Society Annual Meeting, San Antonio, TX, July, 1997

Bush, S. P., In situ field determination of radioactive contamination in soil using a wall-less gas flow proportional counter. Health Physics Society Annual Meeting. Seattle, Washington, July, 1996

Bush, S. P., Issues in Radioactive and Hazardous Waste (Mixed Waste). Great Lakes Chapter of the Health Physics Society Spring Symposium. Ann Arbor, MI, March, 1995

SELECTED HONORS AND AWARDS:

2001	Nuclear Regulatory Commission Leadership Development Program
2000, 2001	NRC Performance Awards
1999	Graduate Student Health Physics Fellowship
1999	Rackham Dissertation Fellowship
1998-1999	Centers for Disease Control and Prevention Fellowship
1996-1999	Rackham Merit Fellowship, University of Michigan
1997	Tuition Award Recipient, Health Physics Summer School on Non-Ionizing Radiation
1996	Honorable Mention, Nuclear Engineering/Health Physics Fellowship
1994-1996	Applied Health Physics Fellow, Oak Ridge Institute for Science and Education

AFFILIATIONS:

1994-Present	Member, Health Physics Society
2000-Present	Member, Baltimore-Washington Chapter of the Health Physics Society
1998	Graduate School Liaison with Council on Education in Public Health (CEPH)
1996-1998	Reviewer, The Journal of Health Physics
1994-2000	Member, Student Chapter of the Health Physics Society, University President (1995)
1994-2000	Member, Great Lakes Chapter of the Health Physics Society

COMPUTER PROFICIENCY:

Several environmental accident analysis codes such as RESRAD, MACCS and HOTSPOT. Shielding Code (SCALE), FORTRAN, UNIX, HTML, several Monte Carlo programs such as Electron Gamma Shower 4 (EGS4) and Crystal Ball and most word, presentation, database and spreadsheet applications, including Microsoft Office and Corel Suite.

**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

PRIVATE FUEL STORAGE L.L.C.

(Independent Spent
Fuel Storage Installation)

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Docket No. 72-22-ISFSI

CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC STAFF'S IDENTIFICATION OF WITNESSES" in the above captioned proceeding have been served on the following through deposit in the NRC's internal mail system, with copies by electronic mail, as indicated by an asterisk this 5TH day of August, 2003:

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